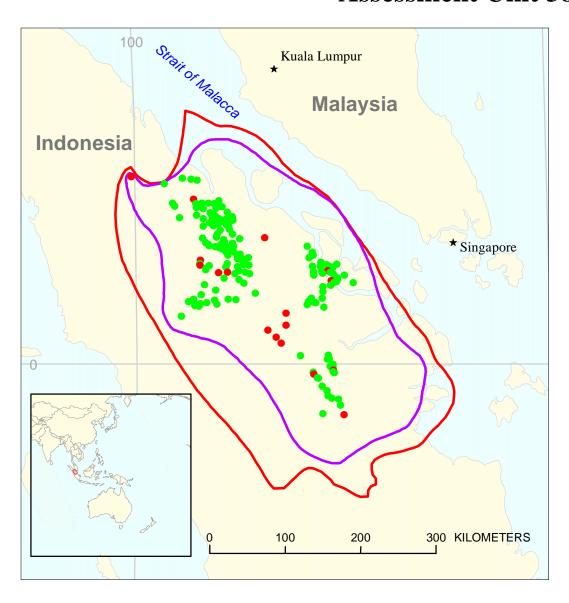
Pematang/Sihapas Siliciclastics Assessment Unit 38080101



Pematang/Sihapas Siliciclastics Assessment Unit 38080101

Central Sumatra Basin Geologic Province 3808

USGS PROVINCE: Central Sumatra Basin (3808) GEOLOGIST: L.S. Smith-Rouch

TOTAL PETROLEUM SYSTEM: Brown Shale-Sihapas (380801)

ASSESSMENT UNIT: Pematang/Sihapas Siliciclastics (38080101)

DESCRIPTION: The assessment unit describes oil and minor gas fields from Eocene and lower Oligocene syn-rift lacustrine sequences that are rich in organic matter. Siliciclastic reservoirs consist of alluvial fan deposits along graben-bounding faults and post-rift deltaic and fluvial sandstones. Late Miocene to Pliocene compression formed anticlinal traps for the oil and gas accumulations. Probable biogenic gas accumulations in the upper Miocene Petani Formation are included with this assessment unit.

SOURCE ROCKS: The Eocene-lower Oligocene Brown Shale is the main source rock. In the grabens, the thickness of the source rock interval is 220 m or more. The total organic carbon (TOC) values of the Brown Shale average 5 percent and may be as high as 20 percent. The kerogen consists of >96 percent amorphous freshwater algae of high molecular weight paraffin with hydrogen index (HI) values higher than 300. The middle and upper parts of the Brown Shale are oil prone whereas the lower part of the Brown Shale is more gas prone.

MATURATION: The main phase of hydrocarbon generation occurred in latest Miocene to early Pliocene time. The oil window in the Aman basin is located at depths between 2000 and 3200 m. The geothermal gradient (~50°C/km) in the Central Sumatra basin is higher than in other Sumatra basins.

MIGRATION: Migration occurred in the latest Miocene and continues into the present. Dominant vertical migration and local lateral migration is restricted to the pods of mature source rocks in the grabens.

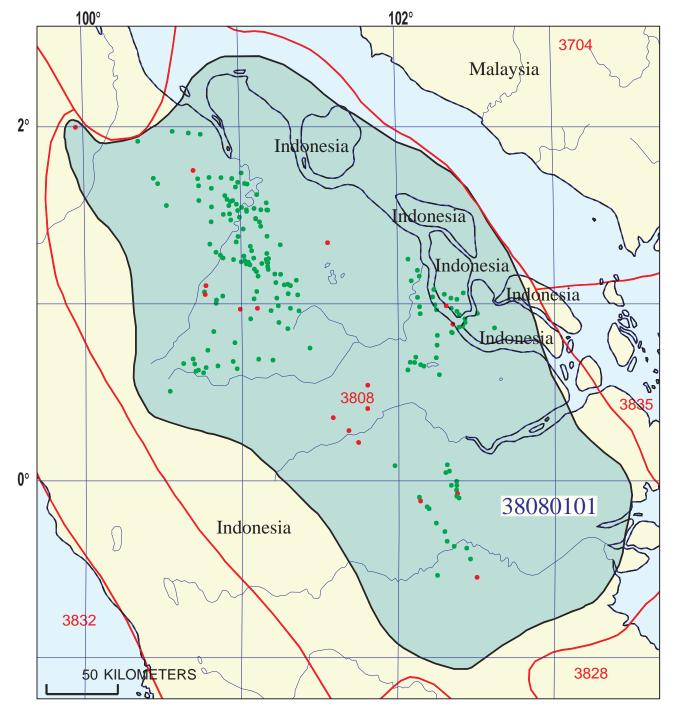
RESERVOIR ROCK: The main reservoir rocks are fluvial, deltaic, and tidal flat sandstones in the late Oligocene and early Miocene Sihapas Group. The sandstone reservoir sequence ranges from 150 to 450 m thick. Also, Eocene and lower Oligocene Pematang Group alluvial fan siliciclastics are good reservoirs.

TRAPS AND SEALS: Traps are formed by late Miocene and Pliocene compressional tectonism accompanying uplift of the Barisan Mountains. The compressional stresses continue to the present day. Structural trap styles are faulted anticlines, wrench-faulted anticlines (flower structures), and graben-bounding rollover anticlines. Locally, facies-change and truncation stratigraphic traps are present. The lower and middle Miocene Telisa Shale of marine origin, equivalent to and overlying the Sihapas Group, is the regional seal. A 25-m thick paleosol in the Pematang Group is a good seal in some grabens as are thin marine shales within the Sihapas Group.

REFERENCES:

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- Longley, I.M., Barraclough, R., Bridden, M. A., and Brown, S.,1990, Pematang lacustrine petroleum source rocks from the Malacca Strait PSC, central Sumatra, Indonesia, *in* Proceedings of the 19th Annual Convention of the Indonesian Petroleum Association: p. 270-288.
- Williams, H. H., Kelly, P.A., Janks, J.S., and Christiansen, R.M., 1985, The Paleogene rift basin source rocks of central Sumatra, *in*, Proceedings of the 14th Annual Convention of the Indonesian Petroleum Association: p. 57-90.



Pematang/Sihapas Siliciclastics Assessment Unit - 38080101

EXPLANATION

- Hydrography
- Shoreline

3808 — Geologic province code and boundary

- --- Country boundary
- Gas field centerpoint

• Oil field centerpoint 38080

Projection: Robinson. Central meridian: 0

Assessment unit code and boundary

SEVENTH APPROXIMATION NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:	5/25/99							
Assessment Geologist:	R.T. Ryder				_			
Region:								
Province:	Central Sumatra Basin	Number:	3808					
Priority or Boutique								
Total Petroleum System:	Brown Shale-Sihapas				Number:	380801		
Assessment Unit:						38080101		
* Notes from Assessor	Six of the fifteen gas fields in the assessment unit produce from the Up							
	Miocene Petani Formati	on (proba	ably biogenic).	MMS gro	wth function			
Oil (<20,000 cfg/bo overall) o	CHARACTERISTICS Gas (>20,000 cfg/bo ov			IIT				
What is the minimum field size (the smallest field that has pot			rown (≥1mmbe ne next 30 yea					
Number of discovered fields e	xceeding minimum size:		_	159	_ Gas:	15		
Established (>13 fields)	X Frontier (1-	13 fields)	H	- Hypothetical	(no fields)			
Median size (grown) of discov	ered oil fields (mmboe):							
	1st 3rd _	41	2nd 3rd_	7	_ 3rd 3rd	6		
Median size (grown) of discov	ered gas fields (bcfg): 1st 3rd	144	2nd 3rd	43	3rd 3rd	256		
Assessment-Unit Probabiliti Attribute 1. CHARGE: Adequate petrol	eum charge for an undisc		ield <u>></u> minimun	n size		ce (0-1.0) 1.0		
2. ROCKS: Adequate reservo						1.0		
3. TIMING OF GEOLOGIC EV	ENTS: Favorable timing	for an ur	ndiscovered fie	ld <u>></u> minim	num size	1.0		
Assessment-Unit GEOLOGIC	C Probability (Product of	1, 2, and	d 3):		1.0			
4. ACCESSIBILITY: Adequa	·							
<u>></u> minimum size						1.0		
	UNDISCO\	/ERED F	IELDS					
Number of Undiscovered Fig	elds: How many undisco	vered fiel	ds exist that a	re <u>></u> minim	um size?:			
	(uncertainty of f	ixed but i	unknown value	es)				
Oil fields:	min. no. (>0)	20	median no.	85	max no.	160		
Gas fields:	min. no. (>0)	10	median no.	20	max no.	40		
Size of Undiscovered Fields	: What are the anticipate (variations in the s		-		ds?:			
Oil in oil fields (mmho)								
	min ciza	1	median sizo	5	may sizo	250		
Gas in gas fields (bcfg):	min. size min. size	<u>1</u>	median size _ median size	5 100	_ max. size max. size	250 2500		

Assessment Unit (name, no.) Pematang/Sihapas Siliciclastics, 38080101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fi	xea but unknown v	/aiues)	
Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)	300	600	900
NGL/gas ratio (bngl/mmcfg)	12	24	36
Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg) Oil/gas ratio (bo/mmcfg)	10	20	30
SELECTED ANCILLARY D. (variations in the proposition of the propositi			maximum 55 0.1 3500
Gas Fields:	minimum	median	
In ant was a section (0/)			maximum
Inert gas content (%)	1	6	maximum 10

0

500

0

2000

0

3500

Hydrogen-sulfide content (%).....

Drilling Depth (m).....

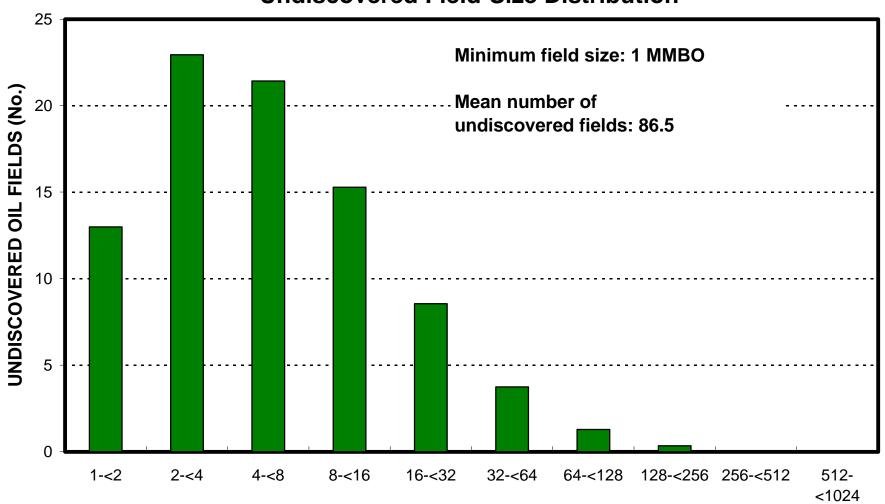
Depth (m) of water (if applicable).....

Assessment Unit (name, no.) Pematang/Sihapas Siliciclastics, 38080101

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

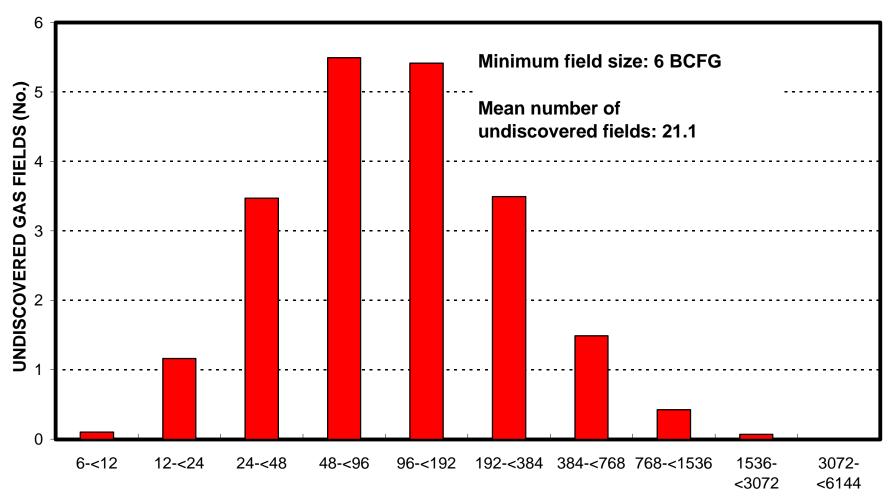
1. Indonesia represent	ts <u>100</u>	areal % of the total assessment unit		
Oil in Oil Fields: Richness factor (unitless multiplier):	minimum	median	maximum	
Volume % in parcel (areal % x richness factor): Portion of volume % that is offshore (0-100%)		100		
Gas in Gas Fields:	minimum	median	maximum	
Richness factor (unitless multiplier): Volume % in parcel (areal % x richness factor): Portion of volume % that is offshore (0-100%)		100		

Pematang/Sihapas Siliciclastics, AU 38080101 Undiscovered Field-Size Distribution



OIL-FIELD SIZE (MMBO)

Pematang/Sihapas Siliciclastics, AU 38080101 Undiscovered Field-Size Distribution



GAS-FIELD SIZE (BCFG)